

## **Fitchburg East Wastewater Treatment Facility - Response To Comments**

On August 20, 2009, the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) public noticed a Draft Permit (MA0100986) for the Fitchburg East Wastewater Treatment Facility.

EPA received comments from the City of Fitchburg, from Kopelman & Paige on behalf of the Town of Lunenburg, from the Town of Westminster, and from the Nashua River Watershed Association. The following are responses to all significant comments received and descriptions of any changes made to the public-noticed permit as a result of those comments.

In many cases, EPA has included original comments nearly verbatim for the convenience of the reader. In others, EPA summarized a comment without repeating here the entirety of the commenter's original text. Many of the details presented in the original comments were not repeated in such digested comments. EPA did not limit its analysis of the comments submitted to the digest presented below, but rather reviewed each original comment in its entirety. Where EPA has summarized a comment, we have done so simply to make this response to comments more accessible to the interested public. No significance should be attached to the form in which EPA cited or summarized the original comment in this response document.

### **The following comments were received from the City of Fitchburg in a letter dated September 21, 2009:**

**Comment #A0:** EPA's proposal to reduce the phosphorus limit from 1.0 mg/l to 0.2 mg/l on an average monthly basis is overly conservative and will impose an unnecessary financial hardship on the residents of the City of Fitchburg, who are already burdened with wastewater capital expenditures totaling over \$30 million during the next five years. EPA appears to have used an overly stringent water quality criterion to develop the proposed limit. Also, the analysis offered by EPA is incomplete and does not support the proposed limit. The City believes that the water quality objectives outlined in the fact sheet can be achieved while avoiding unnecessary and burdensome expenditures with an adaptive management approach to the establishment of a seasonal phosphorus limit in the facility's permit.

**Response #A0:** This general comment is a summary of the City's phosphorus-related comments, and the points made within it are detailed in subsequent, more specific comments, which EPA has reproduced below and styled as Comments #A1-A10. See Responses #A1-A10 for specific responses.

**Comment #A1:** According to the draft fact sheet, the water quality condition that EPA seeks to address with the proposed 0.2 mg/l limit is the listed impairment for nutrients in the Nashua River downstream of its confluence with the North Nashua River and eutrophication in the Pepperell Impoundment. This description of the problem suggesting that eutrophication exists throughout the Nashua River downstream of its confluence with

the North Nashua River is at odds with the draft phosphorus TMDL Report for the Nashua River watershed as well as the Nashua River Watershed 2003 Water Quality Assessment Report. The draft TMDL Report describes the effects of eutrophication as occurring in the Pepperell Impoundment and one mile upstream of the impoundment, while the Assessment Report describes the impairment as occurring only in the impoundment itself. Therefore, these reports do not support the draft fact sheet's suggestion that eutrophication exists throughout the Nashua River downstream of its confluence with the North Nashua River.

**Response #A1:**

The comment's characterization of the draft phosphorus TMDL Report and the 2003 Water Quality Assessment Report is inaccurate. The fact that a not-yet-finalized draft TMDL focused on the most grossly impaired reach of the Nashua River, i.e. the Pepperell Pond Impoundment, does not indicate a conclusion that there is no eutrophication occurring upstream of this reach. In fact, both documents contain evidence of cultural eutrophication in the reaches upstream of the Pepperell Pond Impoundment, as well as in the Impoundment itself, sufficient to justify EPA's conclusion that "the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard" in those reaches. *See* 40 C.F.R. § 122.44(d)(1)(ii).

The receiving water for the Fitchburg East WWTP discharge is the North Nashua River (segments MA81-03 and MA81-04) and the Nashua River downstream of its confluence with the North Nashua River in Lancaster (segments MA81-05, MA81-06 and MA81-07). In developing the phosphorus effluent limit, EPA analyzed the potential to cause or contribute to an excursion above water quality standards at the confluence of the Nashua River (South Branch) and the North Nashua River—the upper boundary of segment MA81-05. *See* Fact Sheet at 10-12. All five of these segments (MA81-03 through MA81-07, inclusive) are listed on the Massachusetts 2008 Integrated List of Waters as "Category 5 – Water requiring a TMDL", and the three Nashua River segments (MA81-05, MA81-06, and MA81-07) are listed for impairment caused by nutrients. The Draft TMDL focuses on all of these segments:

This TMDL is focused on the 7 segments comprising the North Branch and the mainstem Nashua River. On the mainstem this includes the 3 segments for nutrients, 1 of these mainstem segments also for organic enrichment and dissolved oxygen, and 1 of these mainstem segments for noxious aquatic plants. TMDLs for the 4 segments of the North Nashua were included and are considered a protective TMDL for nutrients.

*Draft Nashua River Massachusetts Total Maximum Daily Load for the Nutrient Phosphorus* (2007), at 27 ("Draft TMDL Report").

The Draft TMDL Report does indicate that the worst eutrophic conditions are encountered in the Pepperell Pond Impoundment, located in segment MA81-06, where

surface algal mats blanket the impoundment during extensive portions of the growing season. The report notes that “Pepperell Impoundment is the final area of accumulation of all of the inputs from the full watershed.” *Id.* at 28.

Impacts of increased eutrophication are not limited to this area, however. The Draft TMDL Report states that “the river system currently displays impacts of increased eutrophication as the mainstem of the river slows in the Ice House Impoundment and Groton School areas.” *Id.* The Ice House Impoundment is located in segment MA81-05 (Nashua River from confluence with North Nashua River to confluence with Squannacook River), the segment used in developing the permit limit.

The Draft TMDL also states that “the upper areas of the river did not display high levels of aquatic biomass,” but attributes this to the fact that “higher velocities in the upper reaches do not allow algae to accumulate.” Aquatic biomass generated in the upper reaches instead accumulates “once the velocity slows and the river deepens near Ice House Impoundment, Groton School, and Pepperell Impoundment [which] serve as a catch basin for all the nutrients discharged above.” *Id.* at 29.

The *Nashua River Watershed 2003 Water Quality Assessment Report* (“Assessment Report”), which MassDEP released in August 2008, also supports EPA’s conclusion that that the Fitchburg East discharge “causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard” upstream of the Pepperell Pond Impoundment. To be sure, the Assessment Report found the worst impacts in the portion of the Nashua River from the confluence with Squannacook River, through the Pepperell Pond, to the Pepperell Dam (segment MA81-06), and within that segment, the pond itself. *See* Assessment Report at 71. However, the Nashua River upstream of the Pepperell Pond inlet, and the North Nashua River, were also identified as of concern.

Segment MA81-05 (the Nashua River, from its confluence with the North Nashua River down to the confluence with the Squannacook River) was identified for Alert Status in the 2003 Assessment Report based on nutrient-related findings:

MA DFG collected fish population samples at two sites in 2002. Individuals classified as macrohabitat generalist and moderately pollution intolerant dominated the samples. . . MassDEP DWM in 2003 and MassDEP CERO from 2001 through 2003 collected a total of 27 total phosphorus samples at three sites. The concentrations of the samples ranged from 0.043 mg/L to 0.21 mg/L. An Alert Status is identified for this use due to elevated total phosphorus concentrations and the dominance of macrohabitat generalist in the fish community.

*Nashua River Watershed 2003 Water Quality Assessment Report* at 61. The Assessment Report further noted that segment MA81-05 was classified in the “2006 Integrated List of Waters” as “Category 5 - Waters requiring a TMDL - Cause Unknown, Unknown toxicity, Metals, *Nutrients*, Pathogens, Taste/Odor/Color, Turbidity.” *Id.* In addition, the

two North Nashua River segments that are downstream of the Fitchburg East discharge (i.e., segments MA81-03 and MA81-04) were identified for Alert Status “due to elevated total phosphorus concentrations and low RBP III metrics” indicating that the macroinvertebrate community is “slightly impacted by water quality.” *Id.* at 56, 59.

Additional evidence of impairment upstream of the Pepperell Pond Impoundment is contained in the technical support documents of the 2003 report. The *Nashua River Watershed 2003 Periphyton Technical Memorandum* (“Periphyton Technical Memorandum”) included sampling in segment MA81-03 approximately 0.9 miles downstream of the Fitchburg East discharge (and upstream of the Leominster WWTP) and found the periphyton there to be dominated by cyanobacteria (Lyngbya) and fungal hyphae, with 70% periphyton cover. The report concluded that “[t]he influence of the organic and nutrient enrichment from the Fitchburg East Wastewater Treatment Facility (located less than 1 mile upstream) on the periphyton community is indicated by the dominance of fungi in the periphyton.” *Nashua River Watershed 2003 Periphyton Technical Memorandum* at 4. The Biological Assessment examined the same area and found: “Moss was the only aquatic vegetation present and covered only about 5% of the reach. Thin-film green algae coverage was more extensive, about 70%.” *North Nashua River 2003 Biological Assessment*, MADEP Technical Memorandum TM-81-5, at 6.

The Periphyton Technical Memorandum further noted that green filamentous algae were dominant upstream of the Fitchburg East discharge and suggested that the cyanobacteria and fungal dominance downstream of the Fitchburg East discharge could be due to increased turbidity, TSS, and/or toxicity at that location. *See* Periphyton Technical Memorandum at 4. The report also concluded that the dominance of heterotrophic organisms that use oxygen to break down compounds (instead of producing oxygen like algae do during photosynthesis) could adversely affect in-stream oxygen levels. *See id.* To be sure, the report also concluded that, other than a nuisance algal bloom found upstream of the Fitchburg East WWTF, “the stations sampled along the North Nashua did not exhibit extensive algal growth,” *id.*, but this is entirely consistent with the general principle cited in the draft TMDL report that higher velocities in the upper reaches do not allow algae to accumulate, and that aquatic biomass generated in the upper reaches instead accumulates once the velocity slows and the river deepens downstream.

These reports, along with the 1998 Water Quality Assessment Report and other sources cited in the Fact Sheet, provide ample support for EPA’s determination that the discharge “causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard” in the segments upstream of the Pepperell Pond Impoundment. While EPA disagrees with the commenter’s contention that the reach between the confluence with the North Nashua River and the Squannacook River is not experiencing eutrophication, there does not need to be a documented impairment in order to incorporate a water quality based permit limit, but only a finding that the discharge causes, has the reasonable potential to cause, or contributes to an excursion above the state water quality standard. The Fact Sheet clearly documents the potential for the Fitchburg East discharge to cause or contribute to a violation of narrative criteria.

**Comment #A2:** In the absence of numerical criteria for phosphorus in the Massachusetts Surface Water Quality Standards, EPA used the narrative criteria for nutrients at 314 CMR 4.05(5)(c), which states that nutrients “shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication” as the basis for the proposed phosphorus limit. EPA must show that that it is necessary to control accelerated or cultural eutrophication in the vicinity of the Pepperell Impoundment, a distance of approximately 29.9 river miles downstream of the Facility’s discharge. See Draft Nashua River Phosphorus TMDL Report at 5; Nashua River Watershed 2003 Water Quality Assessment Report at 61-62, 71-63.

**Response #A2:**

The Fitchburg East WWTP’s receiving water, the North Nashua River, is designated in the Massachusetts water quality standards as a Class B water. Class B waters “are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation,” and “shall have consistently good aesthetic value.” 314 C.M.R. 4.05(3)(b). Like all Massachusetts surface waters, they “shall be free from pollutants in concentrations or combinations that . . . produce undesirable or nuisance species of aquatic life.” 314 C.M.R. 4.05(5)(a). Finally, all surface waters must meet the nutrient criteria of 314 C.M.R. 4.05(5)(c), which reads in full:

Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.

Since MassDEP has not yet developed site-specific criteria through a TMDL or otherwise, the relevant nutrient water quality standard for present purposes in 314 C.M.R. 4.05(5)(c) is the narrative standard.

EPA’s NPDES permit must contain “[l]imitations [that] control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which [EPA] determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard,

including State narrative criteria for water quality.” 40 C.F.R. § 122.44(d)(1)(i); *see also* CWA § 301(b)(1)(C). For those pollutants “[w]here [the] State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard,” EPA must establish effluent limits by one or more of three enumerated methods. 40 C.F.R. § 122.44(d)(1)(vi). This standard of “reasonable potential to cause, or contribute to an excursion above any State water quality standard” is distinct from the standards used for determining how water segments should be categorized pursuant to CWA §§ 303(d), 305(b), or other provisions.

The fact sheet presents the basis for EPA’s “reasonable potential” finding, based on consideration of a broad range of factors, including in-stream total phosphorus concentrations, observations of eutrophication, and ecoregional and “Gold Book” criteria. *See* Fact Sheet at pp. 9-13. As set forth in Response #A1, the evidence supports EPA’s conclusion that the Fitchburg East discharge “causes, has the reasonable potential to cause, or contributes to an excursion of numeric or narrative water quality criteria” in the segments upstream of the Pepperell Pond Impoundment. Therefore EPA must establish effluent limits that will ensure attainment of water quality standards in the upstream segments as well as the impoundment itself. 40 C.F.R. § 122.44(d)(1)(vi).

EPA calculated the permit limit based on meeting the Gold Book’s recommended phosphorus criterion at the confluence of the Nashua River (South Branch) and the North Nashua River. *See* Fact Sheet at 10-12. This segment of the river (MA81-05), between the confluence with the North Nashua River and the Squannacook River, is listed on the 2006 and 2008 Integrated List of Waters as a Category 5 - Water requiring a TMDL, and nutrients are listed as one of the potential causes. The 2003 Assessment Report indicates that phosphorus concentrations in this reach ranged from 43 – 210 ug/l and that an “Alert Status is identified for this use due to elevated total phosphorus concentrations and the dominance of macrohabitat generalist in the fish community.” EPA’s general approach in developing these phosphorus effluent limits is to ensure attainment of water quality standards throughout the river, not just in the impoundment. *Cf.* Gold Book at 241 (“There are two basic needs in establishing a phosphorus criterion for flowing waters: one is to control the development of plant nuisances within the flowing water . . . ; the other is to protect the downstream receiving waterway, regardless of its proximity in linear distance. It is evident that a portion of that phosphorus that enters a stream or other flowing waterway eventually will reach a receiving lake or estuary either as a component of the fluid mass, as bed load sediments that are carried downstream, or as floating organic materials that may drift just above the stream’s bed or float on its water’s surface.”). This segment was therefore appropriate for analysis in setting the permit effluent limit and EPA is required to establish an effluent limit that will attain water quality standards in this segment.

The effluent limit must also ensure attainment of standards in Pepperell Impoundment. As indicated in the Fact Sheet, the permit limit for phosphorus is consistent with preliminary modeling conducted by MassDEP as part of the TMDL effort that indicated

the need for a 0.2 mg/l phosphorus limit for the Fitchburg East discharge. While this modeling is preliminary and has not been finalized by MassDEP (let alone approved by EPA), it is the most complete available analysis of loadings to the Pepperell Pond Impoundment at this point and indicates that an effluent limit of 0.2 mg/l or less is necessary to meet water quality standards in the Impoundment. Should future modeling or other information indicate that a lower effluent limit may be necessary to meet water quality standards in the Impoundment, EPA will reconsider this effluent limit in accordance with 40 C.F.R. parts 122 and 124.

**Comment #A3:** Although the Assessment Report contains observed in stream phosphorus concentrations higher than 0.2 mg/l, it also found no evidence of nutrient-related impairments in the Nashua River between its confluence with the North Nashua River and Squannacook River. Therefore, the 0.1 mg/l Gold Book criterion used by EPA to develop the proposed limit appears to be more stringent than needed to protect the Nashua River from the effect of eutrophication.

**Response #A3:** As set forth in Response #A1, the characterization of the draft TMDL Report is inaccurate.

The 0.1 mg/l Gold Book recommended criterion is not unduly stringent. Numerous technical sources support standards at or lower than the 0.1 mg/l Gold Book recommended criterion that was used to develop the permit limit. As noted in the Fact Sheet, EPA's Ecoregion guidance suggests a protective concentration of 0.24 ug/l in this region. EPA has considered additional sources of information that are consistent with this criterion. The Nutrient Criteria Technical Guidance Manual: Rivers and Streams (EPA 2000) ("Nutrient Criteria Technical Guidance Manual"), cites to a range of ambient concentrations drawn from the peer-reviewed scientific literature that are sufficiently stringent to control periphyton and plankton (two types of aquatic plant growth commonly associated with eutrophication). This guidance indicates in-stream phosphorus concentrations between 0.01 mg/l and 0.09 mg/l will be sufficient to control periphyton growth and concentrations between 0.035 mg/l and 0.070 mg/l will be sufficient to control plankton. Similarly, several states have adopted numeric criteria and guidelines for total phosphorus, and the value of 0.1 mg/l is consistent with this range. (Table 1 shows the range of literature values cited in the Nutrient Criteria Technical Manual, and Table 2 shows a range of phosphorus criteria established by various states)

Table 1						
Nutrient (ug/l) and algal biomass criteria recommended to prevent nuisance conditions and water quality degradation in streams based either on nutrient-chlorophyll <i>a</i> relationships or preventing risks to stream impairment as indicated.						
PERIPHYTON Maximum in mg/m <sup>3</sup>						
TN	TP	DIN	SRP	Chlorophyll <i>a</i>	Impairment Risk	Source
				100 – 200	nuisance growth	Welch et al. 1988, 1989
275 – 650	38 – 90			100 – 200	nuisance growth	Dodds et al. 1997
1500	75			200	eutrophy	Dodds et al. 1998
300	20			150	nuisance growth	Clark Fork River Tri-State Council, MT
	20				<i>Cladophora</i> nuisance growth	Chetelat et al. 1999
	10 – 20				<i>Cladophora</i> nuisance growth	Stevenson unpubl. data
		430	60		eutrophy	UK Environ. Agency 1988
		100 <sup>1</sup>	10 <sup>1</sup>	200	nuisance growth	Biggs 2000
		25	3	100	reduced invertebrate diversity	Nordin 1985
			15	100	nuisance growth	Quinn 1991
		1000	10 <sup>2</sup>	~ 100	eutrophy	Sosiak pers. comm.
PLANKTON Mean in ug/l						
TN	TP	DIN	SRP	Chlorophyll <i>a</i>	Impairment Risk	Source
300 <sup>3</sup>	42			8	eutrophy	Van Nieuwenhuysse and Jones 1996
	70			15	chlorophyll action level	OAR 2000
250 <sup>3</sup>	35			8	eutrophy	OECD 1992 (for lakes)
1 30-day biomass accrual time 2 Total Dissolved P 3 Based on Redfield ratio of 7.2N:1P (Smith et al. 1997)						

Source: *Nutrient Criteria Technical Guidance Manual – Rivers and Streams*. EPA-822-B-00-002. U.S.EPA. July, 2000.



<b>Table 2</b>		
<b>Examples of Numeric Criteria and Guidelines for Total Phosphorus in the U.S.</b>		
<b>State and Waters</b>	<b>Phosphorus Criteria Values</b>	<b>Reference</b>
<b>Arizona</b> River Specific	Annual Mean 0.05 – 0.20 mg/l 90 Percentile: 0.10 – 0.33 mg/l Single Sample Maximum: 0.20 - 1.0 mg/l	AAC R18-11-109
<b>Arkansas</b> All Waters	Maximum: 0.100 mg/l (guideline)	2 AAC 2.509
<b>Hawaii</b> Inland Streams	Geometric Mean, not to exceed 0.05 mg/l – Wet Season (Nov.1 – Apr.30) 0.030 mg/l – Dry Season (May 1 – Oct. 31)	HAR 11-54-5.2
<b>Illinois</b> Streams at entrance to reservoir or lake with surface area of 8.1 hectares or more	Maximum: 0.05 mg/l	35 IAC 302.205
<b>Nevada*</b> River Specific	Monthly, average: 0.1 mg/l	NAC 445A
<b>New Jersey</b> Streams	Maximum: 0.1 mg/l, unless demonstrated that TP is not a limiting nutrient and will not render the waters unsuitable for designated uses.	NJAC 7:9B-1.14(c)
<b>New Mexico</b> Perennial reaches of specific waters in Rio Grande, Pecos River, and San Juan River basins	Maximum (single sample): 0.1 mg/l	20 NMAC 6.4.109 20 NMAC 6.4.208 20 NMAC 6.4.404 20 NMAC 6.4.407
<b>North Dakota</b> Class I, IA, II and III streams	Maximum: 0.1 mg/l (interim guideline)	NDAC 33-16-02-09
<b>Oregon</b> Yamhill River and its tributaries	Monthly median: 0.070 mg/l as measured during summer low flow	OAR 340-041-0350
<b>Utah</b> Streams and rivers to protect aquatic life; 3B, 3C waters	Maximum: 0.05 mg/l (used as pollution indicator; when exceeded, further investigations are conducted)	UAC R317-2 (Table 2.14.2)
<b>Vermont</b> Upland streams (> 2,500 ft.)	Maximum: 0.010 mg/l at low median monthly flow	VWQS 3-01-B2
<b>Washington</b> Spokane River (river mile 34 – 58)	Average euphotic zone: 0.025 mg/l (during June 1 to October 1)	WAC 173-201A-130
* Different requirements may exist to maintain existing higher quality streams.		

Source: *A Literature Review for use in Nutrient Criteria Development for Freshwater Streams and Rivers in Virginia*. Virginia Polytechnic Institute and State University – Virginia Water Resources Research Center. 2006.

After considering all of the above sources of information, EPA decided to apply the Massachusetts narrative water quality standards through a 0.1 mg/l in-stream phosphorus criterion, rather than the more stringent ecoregional criteria, given that the 0.1 mg/l criterion was developed from an effects-based approach versus the ecoregional criteria that were developed on the basis of reference conditions. The effects-based approach is taken because it is more directly associated with an impairment to a designated use (e.g., healthy aquatic life, swimming). The effects-based approach provides a threshold value above which adverse effects (i.e. water quality impairments) are likely to occur. It applies empirical observations of a causal variable (i.e. phosphorus) and a response variable (i.e. chlorophyll a) associated with designated use impairments. Reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregional class. They are a quantitative set of river characteristics (physical, chemical, and biological) that represent minimally impacted conditions. While reference conditions, which reflect minimally disturbed conditions, will meet the requirements necessary to support designated uses, they may also surpass the water quality necessary to support such requirements. Consequently, the effects-based 0.1 mg/l criterion is more appropriate in this instance.

If other information indicates that a lower in-stream phosphorus concentration may be necessary to meet Massachusetts water quality standards, then EPA will reconsider the 0.1 mg/l criterion in accordance with 40 C.F.R. parts 122 and 124.

**Comment #A4:** EPA should have performed its dilution calculations using river flows in the segment of the Nashua River immediately upstream of the Pepperell Impoundment where eutrophication is actually occurring, not in the segment immediately downstream of the Nashua River's confluence with the North Nashua River where there is no evidence of eutrophication. The Assessment Report indicates that both the North Nashua River and the main stem of the Nashua River from its confluence with the North Nashua down to the Squannacook River support aquatic life uses and aesthetics. In fact, the Assessment Report identifies segment MA81-06 as meeting applicable criteria.

**Response #A4:** See Response #A1, particularly the discussion regarding segment MA81-05. Furthermore, the comment is incorrect in stating that the Assessment Report identifies segment MA81-06 as meeting applicable criteria. To the contrary, the Assessment Report notes that segment MA81-06 is listed on the 2006 Integrated List of Waters as "Category 5 - Waters requiring a TMDL - Cause Unknown, Metals, *Nutrients*, *Organic enrichment/Low DO*, *Noxious aquatic plants*, *Turbidity*." Assessment Report, at 71 (emphasis added). (Furthermore, although the Assessment Report predated the December 2008 Integrated List of Waters, it is worth noting that the 2008 Integrated List of Waters also lists segment MA81-06 as a Category 5 water requiring a TMDL, with pollutants needing a TMDL identified as "Cause Unknown, Metals, Nutrients, Organic enrichment/Low DO, Noxious aquatic plants, and Turbidity." See 2008 Integrated List of Waters, at 126.) The Assessment Report further states that Pepperell Pond is impaired for Aquatic Life Use, with the causes of impairment listed as "[n]on-native aquatic

plants, nutrient/eutrophication biological indicators” and the sources of impairment identified as including “municipal point source discharges.” Assessment Report, at 71. The comment may be referring to the Assessment Report’s statement that the segment of MA81-06 upstream of the Pepperell Pond inlet met dissolved oxygen, temperature, and pH criteria. *See id.* If so, this is largely irrelevant, as EPA’s reason for imposing water quality-based phosphorus effluent limits was not derived from a reasonable potential to exceed dissolved oxygen, temperature, or pH criteria.

As noted above, the permit limit was developed based on meeting water quality standards at the confluence of the Nashua and North Nashua Rivers (i.e., the upper end of segment MA81-05). *See* Response #A2. Consequently, it is appropriate to calculate dilution using river flows for that same segment.

**Comment #A5:** In performing the dilution calculations, EPA also should have used average summer flows rather than the 7Q10 flow. Use of the 7Q10 flow is overly conservative because reflects an infrequent condition of short duration, while eutrophication is caused by excessive nutrient loadings over an extended period of time. Average summer flows correspond more closely to longer term average flows associated with eutrophication. EPA adopted this approach when it approved the TMDL for the Lower Charles River which used average summer flows to assess nutrient loadings on water quality.

Use of the 7Q10 flow is not mandated in this case by 314 CMR 4.03 (3) (a) because the criterion utilized by EPA to derive the limit is not an aquatic life criterion. *See* 314 CMR 4.05(5)(e) which establishes the criteria for the protection of aquatic life. This section does not include phosphate.

Further, the Assessment Report does not point to any evidence of impaired aquatic life uses in the Nashua River upstream of the Pepperell Impoundment. Although Segment MA81-05 is listed as impaired, this listing appears to be in error based on the Assessment Report. *See* Assessment Report at pages 61, 62, and 71.

**Response #A5:** The Gold Book values are recommended as “not to be exceeded” values and thus are appropriately applied at a low flow such as 7Q10. *See* Gold Book at 240 (“To prevent the development of biological nuisances and to control accelerated or cultural eutrophication, total phosphates and phosphorus (P) *should not exceed* 50 µg/L in any stream at the point where it enters any lake or reservoir, nor 25 µg/L within the lake or reservoir. A desired goal for the prevention of plant nuisances in streams or other flowing waters not discharging directly to lakes or impoundments is 100 µg/L total P.”) (emphasis added); *cf. In re City of Attleboro, Massachusetts Wastewater Treatment Plant (“Attleboro”),* NPDES Appeal No. 08-08, 14 E.A.D. \_\_\_, slip op. at 61-64 (EAB, Sept. 15, 2009). Furthermore, several states apply the same value (0.1 mg/l) on an instantaneous basis. *See* Table 2 (above); *Attleboro*, slip op. at 63 & n.86.

The use of averaging periods longer than the 7Q10 period may be appropriate where the target criterion used is based on longer term average conditions. In this case, however,

the criterion used (100 ug/l) is not an average criterion but rather a “not to be exceeded” criterion. EPA’s ecoregion criterion is an example of a longer term average criterion (24 ug/l) that would be appropriately applied during average conditions. While the Lower Charles River TMDL established phosphorus loads based on achieving a seasonal average criterion, the seasonal average chlorophyll a criterion that the TMDL used corresponds to an average in-stream phosphorus level of 28 ug/l. EPA New England’s TMDL Review - Lower Charles River Basin Nutrient (Phosphorus) TMDL, at 7 (<http://epa.gov/ne/eco/tmdl/pdfs/ma/lowercharles.pdf>). Use of the 7Q10 flow in combination with the “not to be exceeded” Gold Book criterion does not generate an overly conservative effluent limit. A comparable result would be reached here if the “summer average dilution” set forth in the comment were combined with a longer term average criterion such as that used in the Lower Charles River TMDL.<sup>1</sup>

Further, EPA disagrees that an extended period of time is necessary before the effects of eutrophication can be seen. “Nuisance levels of algae and other aquatic vegetation (macrophytes) can develop rapidly in response to nutrient enrichment when other factors (i.e., light, temperature, substrate, etc.) are not limiting” (Nutrient Criteria Technical Guidance Manual Rivers and Streams – Chapter 1, Pg. 4).

Use of the 7Q10 receiving water flow is also consistent with the Massachusetts Surface Water Quality Standards. 314 C.M.R. 4.03(3)(a) provides that “[MassDEP] will determine the most severe hydrologic condition at which water quality criteria must be applied. . . . For rivers and streams, the lowest flow condition at and above which aquatic life criteria must be applied is the lowest mean flow for seven consecutive days to be expected once in ten years. When records are not sufficient to determine this condition, the flow may be estimated using methods approved by the Department.” The comment’s statement that the narrative criteria at issue here are not aquatic life criteria is incorrect. The comment cites 314 C.M.R. 4.05(5)(e), which is the section of the standards addressing toxics. This section does not set forth the definition of aquatic life criteria. While the Massachusetts water quality standards do not define “aquatic life criteria” in particular, they do define aquatic life as “[a] native, naturally diverse, community of aquatic flora and fauna including, but not limited to, wildlife and threatened and endangered species.” 314 CMR 4.02. The designated uses for Class B waters specifically provide that such waters shall be “habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions,” 314 C.M.R. 4.05(3)(b). While phosphorus is not generally considered a toxic pollutant, criteria for phosphorus are clearly established to prevent impairment of aquatic life. *See generally* 314 C.M.R. 4.05(5)(c) (“Unless naturally occurring, all surface waters shall be

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<sup>1</sup> The comment suggests a dilution factor of 7.6:1 as consistent with the commenter’s interpretation of the approach in the Charles River TMDL. If this were combined with a phosphorus concentration consistent with the Charles River TMDL (0.028 mg/l) the resulting effluent limit would be:

$$\begin{aligned}\text{Dilution factor} * \text{criterion} &= \text{Effluent limit} \\ 7.6 * 0.028 \text{ mg/l} &= 0.21 \text{ mg/l}\end{aligned}$$

This calculation is presented for illustrative purposes only; EPA does not adopt nor affirm the approach or the calculations set forth in the comment.

free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses . . . .”); *see also id.* 4.05(5)(a) (“All surface waters shall be free from pollutants in concentrations or combinations that . . . produce undesirable or nuisance species of aquatic life.”); Gold Book at 240-41 (describing deleterious effects of excessive or nuisance growths of aquatic life, including both aquatic plants and associated animal pests). *See also Attleboro*, slip op. at 58 & n.78.

Regarding impairment and the reasonable potential for excursions above water quality standards, see Responses #A1-A3.

**Comment #A6:** EPA’s use of the 7Q10 flow in combination with the Facility’s design flow in its dilution calculations adds yet another layer of overly conservative assumptions to its dilution calculations. The 7Q10 flow reflects drought conditions, while the Facility’s design flow reflects average annual flows. Since the Facility’s design flow includes flows contributed by infiltration and inflow under average conditions, the Facility would never be operating at its design flow under 7Q10 conditions. Therefore, if EPA is going to use the 7Q10 flow in its dilution calculations, it should use a Facility design flow that corresponds to a 7Q10 flow, which would be 8.4 MGD rather than the 12.5 MGD flow figure used by EPA in its calculations.

**Response #A6:** The use of 7Q10 to calculate water quality-based limits is required by Massachusetts Water Quality Standards. See Response #A5; 314 CMR § 4.03(3)(a)). EPA typically uses the design flow of the POTW when calculating water quality-based effluent limits that are based on a finding of a reasonable potential to cause or contribute to an excursion above state water quality standards at or near the point of discharge. This approach ensures that the size of the mixing zone is minimized (particularly for toxic pollutants) and water quality standards are achieved. Moreover, there is a reasonable scenario in which short term treatment plant discharge flows may approach design flow while the upstream receiving water flow remains low, such as caused by diurnal flow variations and localized rainfall events (particularly in combined sewer communities such as Fitchburg).

However, for this discharge, EPA did not establish the phosphorus effluent limits based on the point of discharge, but based on the downstream segments along the mainstem Nashua River that represent the most impacted areas based on available water quality assessments. See Responses #A1 and A4. It was EPA’s judgment that these mainstem segments represent worst case conditions and that an effluent limit set to meet standards there will be sufficiently protective at the point of discharge.<sup>2</sup> Therefore, EPA analyzed whether MassDEP’s “highest and best” effluent limitations (i.e., 0.2 mg/l) would be adequate to ensure attainment of water quality standards at segment MA81-05, which begins approximately 12 miles downstream of the East Fitchburg discharge and receives

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<sup>2</sup> The North Nashua River, to which the facility discharges, is a free-flowing water with a relatively steep slope, significant tree cover and a sandy bottom. This has allowed the segment to remain relatively free of gross signs of eutrophication compared with the mainstem segments.

phosphorus discharges from three publicly owned treatment works (East Fitchburg, Leominster, and MWRA Clinton).<sup>3</sup>

For purposes of this determining whether a 0.2 mg/l effluent limit would ensure attainment of water quality standards in segment MA81-05, EPA considered a range of flow assumptions, given the distance of the impaired segment downstream from the discharges.<sup>4</sup> These assumptions ranged from dry weather monthly average flows (5.4 MGD for Fitchburg East), which are representative of flows discharged by the facilities under 7Q10 conditions, to annual average design flow (12.4 MGD). See Fact Sheet at 10-12.

As part of its response to this comment, EPA further evaluated whether a seasonally-adjusted design flow would suggest different permit limits. See Attachment A. This methodology relies on the principle that, over the course of a year, WWTPs will experience a variation in flow, with the lowest flows under dry weather conditions and the highest flow in wet weather. This is due to infiltration and inflow (I/I) into the system, so that with conditions of high groundwater and runoff on the surface there will be significantly higher flows through the treatment plant. The 7Q10 flow as measured at the confluence of the South Branch and the North Nashua River consists of a non-POTW or upstream component (i.e., 7Q10 river flow before the river reaches the treatment plants) and a POTW-related component (i.e., the WWTPs' collective discharge flow under 7Q10 conditions), and this latter component accounts for a substantial portion of the predicted 7Q10 flow at the confluence of the South Branch and the North Nashua River. See Fact Sheet at 10-12. Currently, the 7Q10 flow is approximately 60% of the plants' annual average flow. It is reasonable to assume that if the plants experience growth to the point that they are discharging at their maximum permitted flow (i.e., design flow) as an annual average, then the 7Q10 flow would still be approximately 60% of this annual average flow. Therefore, under the scaling methodology, the 7Q10 flows are scaled upward to account for potential growth as facilities reach design flow. This method results in a calculated effluent limit of (depending on assumed attenuation) approximately 0.19 mg/l, only slightly below the 0.2 mg/l effluent limit in the draft permit. See Attachment A.

The flow suggested in the comment (8.4 MGD) is within the range considered by EPA in the Fact Sheet and Attachment A. At an effluent limit of 0.2 mg/l, the predicted concentration is slightly under the 0.1 mg/l Gold Book criterion under dry weather monthly average flow conditions (based on 5.4 MGD POTW flow), and is somewhat greater than the criterion under annual average design flow conditions (based on 12.4 MGD POTW flow). See Fact Sheet at 11-12. The flow suggested in the comment is

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<sup>3</sup> As noted in the Fact Sheet, the Fitchburg West POTW is not a significant phosphorus contributor due to the nature of the influent (paper mill wastewater)

<sup>4</sup> There are numerous processes that can affect the impact of a specific discharge on water quality at a downstream location, including the attenuation of the discharged pollutants through sedimentation and biological uptake, resuspension and re-release of previously discharged pollutants from sediments and decay of vegetation, dispersion and attenuation of the discharge flow as it moves downstream through the watercourse, and contributions of pollutants and flow from other sources.

approximately the midpoint of the range considered by EPA and would also require an effluent limit of 0.2 mg/l in order to meet the 0.1 mg/l Gold Book criterion.

Finally, the calculations shown in Attachment A show that adjusting variables such as estimated assumed 7Q10 or attenuation rate results in only very small changes to the resulting calculated effluent rate. In short, EPA has analyzed this facility's impact under a variety of flow scenarios (including dry weather flow calculated as the lowest monthly average from June-September 2004-2006; design flow; permittee's proposed dry-weather flow; and seasonally-adjusted design flow) and attenuation rates, and all these scenarios suggest that an effluent limit of 0.2 mg/l yields in-stream phosphorus concentrations that are either at, slightly below, or slightly above the in-stream criterion of 0.1 mg/l. Given the small differences, and the acknowledged unknowns, we have retained the 0.2 mg/l effluent limitation.

**Comment #A7:** EPA's analysis also fails to account for phosphorus losses from attenuation that occurs between the Facility's discharge point and the area immediately upstream of the Pepperell Impoundment. While the draft fact sheet acknowledges that there may be "some" attenuation of phosphorus discharged by the Facility, EPA concluded that losses from attenuation are offset by nonpoint source loads which are not accounted for in the calculations. However, this conclusion overlooks the fact that the dilution calculations are based on a 7Q10 flow when attenuation is greatest and nonpoint source loads are virtually nonexistent. Therefore, EPA's analysis should have calculated phosphorus losses from attenuation and included these losses in its dilution calculations

**Response #A7:** While there is no requirement to consider attenuation when establishing water quality based permit limits, *see In re City of Attleboro, MA Wastewater Treatment Plant*, NPDES Appeal No. 08-08, slip op. at 36 (EAB, Sept. 15, 2009), EPA has considered attenuation effects in appropriate cases where data is available to support the determination of an attenuation rate. In this case no such data is available, and the comment does not identify or provide any data or analysis upon which EPA could base an attenuation rate. EPA's consideration of attenuation in the North Nashua River is therefore qualitative in nature, and it is EPA's conclusion that attenuation in the North Nashua River is minimal.

On a qualitative level, the cycling of phosphorus within a water column involves a number of factors including the take-up of phosphorus by algae and aquatic plant growth, partitioning of dissolved phosphorus into sediments, and deposition of particulate phosphorus onto the riverbed, along with the countervailing effects of release of phosphorus as vegetation dies and decays, release of dissolved phosphorus from sediments, and resuspension of particulate phosphorus. To the extent that phosphorus is removed from the water column by these processes such removal is only temporary, and the nutrients are retained in the system where they are subject to future release, or may be washed downstream to accumulate in the sediments in impounded reaches such as the Pepperell Pond Impoundment. Thus, unlike some other pollutants -- nitrogen, for example, can undergo denitrification processes that convert dissolved forms of nitrogen

to gas form – the major processes of phosphorus attenuation do not permanently remove it from the river system. See also Response #A6 and note 4.

The comment does not provide any basis for determining which of these processes is dominant in the North Nashua River, but the nature of the North Nashua River would indicate that attenuation is minimal. The North Nashua does not have major impoundments that would serve as sinks for phosphorus. This segment of the river is not characterized by excessive vegetative growth, despite the extremely high phosphorus levels in the river, indicating low levels of vegetative uptake. It should also be noted that the reduction of phosphorus levels that will result from the permit limits is expected to reduce phosphorus uptake, further reducing current attenuation rates.

In addition, the comment provides no support for the contention that nonpoint source loads are “virtually nonexistent” during 7Q10 conditions. The 2003 survey indicated that background phosphorus concentrations above Clinton and above West Fitchburg ranged from 12 – 15 ug/l during the low flow months of July and August.

Although the comment does not provide any suggested attenuation rate or basis from which EPA could determine an attenuation rate, EPA has nonetheless calculated the effect of a range of attenuation rates that it considers the highest plausible rates for this system (i.e. 5% and 10% attenuation), in combination with the available background phosphorus concentration. The calculation is set forth in Attachment A. This analysis shows that explicitly accounting for estimated attenuation, and adjusting the estimated attenuation rate, results in only very small changes to the resulting calculated effluent rate. Given the small differences, and the acknowledged unknowns, we have retained the 0.2 mg/l effluent limitation as necessary to meet water quality standards at this downstream location.

**Comment #A8:** EPA’s analysis should have accounted for phosphorus load reductions that will occur as a result of combined sewer separation projects and upgrades to the head works and wet weather treatment capacity at the Facility.

**Response #A8:** While these long overdue projects are important and will reduce wet weather phosphorus loadings to the river and accumulation of phosphorus in the impoundments, they will have a minimal effect on dry weather, low flow phosphorus levels in the relatively free flowing reaches below the Fitchburg East discharge.

**Comment #A9:** EPA should employ an adaptive management approach to establishing the summer phosphorus limit given the overly conservative nature of the analysis underlying the proposed 0.2 mg/l limit and the financial hardship that this limit will impose on those served by the Facility. The limit should be reduced from 1.0 mg/l to 0.75 mg/l to reflect the dilution calculations using average summer flows. A decision regarding the need for a limit more stringent than 0.75 mg/l would be deferred pending an assessment of water quality in the Nashua River reflecting the impact of point and nonpoint source phosphorus load reductions throughout the watershed over the next five years.



The City recognizes that the water-quality based requirements of the Clean Water Act must be achieved regardless of the financial consequences. However, we believe the approach that we propose here is consistent with the Clean Water Act's requirements given the uncertainty surrounding the correct phosphorus limit for the Facility and the multiple conservative assumptions built into the analysis.

The City has already committed to undertake wastewater projects with capital costs totaling over \$30 million. The upgrades to meet a 0.2 mg/l phosphorus limit are estimated to cost between \$18 million and \$30 million in capital cost and add approximately \$150,000 per year to the Facility's operation and maintenance cost. Together, these projects would impose a significant burden on a community already struggling with a high unemployment rate and dwindling manufacturing base.

The upgrades and operational enhancement required to meet 0.75 mg/l phosphorus limit may reduce the effluent phosphorus concentration to less than 0.75 mg/l. If EPA will agree to our 0.75 mg/l limit proposal, the City will agree to a narrative effluent limit requiring us to optimize performance of our phosphorus removal processes to achieve the lowest effluent phosphorus concentration possible.

Our proposal will more fairly and equitably allocate responsibility for the phosphorus load reductions needed to address eutrophication in the Nashua River. The draft permit calls for an 80% reduction in the phosphorus load from the Facility on top of the significant load reductions that will be achieved by the other Fitchburg projects described above. The Draft TMDL Report proposes a 0.5 mg/l phosphorus limit (a 50% reduction) from the MWRA Clinton plant and a 20% reduction in nonpoint sources phosphorus loads in the watershed. While the City is prepared to do its fair share to achieve compliance with water quality standards in the watershed, it is apparent that the phosphorus limit proposed in the draft permit imposes a disproportionate burden on the City.

**Response #A9:** It is very unlikely that water quality standards can be met with a limit of 0.75 mg/l. For the reasons discussed above, the limit has not been established based on an overly conservative analysis. *See also* Response #A2 regarding modeling available to date and the possibility of future modeling or other information.

On the contrary, it is quite possible that future information might indicate that a lower effluent limit is necessary. *See* Response #A2. We strongly encourage the permittee to design facility upgrades that are compatible with further upgrades that may be needed to meet a lower limit in the future in order to minimize technical, financial, or other complications in the event that a future NPDES permit imposes a phosphorus effluent limit lower than 0.2 mg/l.

Although the Draft TMDL Report proposes a 0.5 mg/l phosphorus limit for the Clinton plant, this report has not been finalized by MassDEP, let alone approved by EPA, and EPA has not yet issued a draft permit for the Clinton plant. The analysis in the Fact

Sheet was based on Clinton meeting a phosphorus limit of 0.2 mg/l, *see* Fact Sheet at 11, and not 0.5 mg/l as indicated in the draft TMDL report. While prospective effluent limits for a not-yet-proposed permit for the Clinton plant are outside the scope of this permit proceeding, EPA notes that the comment does not provide any basis for a conclusion that a limit of 0.5 mg/l for the Clinton plant could ensure attainment of water quality standards.

With respect to scheduling, implementation, and cost, EPA agrees with the comment that cost and technological considerations are not factors in setting water quality-based effluent limits. *See Attleboro*, slip op. at 46-47. That said, after permit issuance, the permittee is welcome to discuss with EPA the possibility of including a compliance schedule in an administrative compliance order to be issued under CWA § 309(a). EPA has authority to issue a compliance order under CWA § 309(a) (either unilaterally or after negotiating a schedule with the permittee) that could potentially include phased or longer term implementation of upgrades.

While it is not relevant or necessary to EPA's analysis under 40 C.F.R. § 122.44, it should be noted that Fitchburg has enjoyed one of the lowest sewer rates in the state for many years. For 2002 - 2006, the statewide average sewer rate was \$417 while Fitchburg's average sewer rate was \$144. Only very recently have sewer rates in Fitchburg increased significantly and they are still 22% less than the statewide average (2009).

**Comment #A10:** A monitoring only requirement should be substituted for the May ammonia limits because May is a transition period when in stream flows are high enough to avoid any potential for instream ammonia toxicity. Further, cold water temperatures in May have traditionally made it difficult to nitrify during this month, thereby making it difficult for the City to maintain consistent compliance with these limits. In fact, cold water temperatures and the resulting loss of nitrification have prevented the City from complying with the May ammonia limits on a consistent basis.

We also question why this and the June 1-October 31 ammonia limit are expressed as a daily maximum when 40 C.F.R. § 122.45(d)(2) specifies that effluent limits for POTWs are to be expressed as average weekly and average monthly limits. Please explain the justification for the daily maximum limits.

**Response #A10:** The ammonia limits in the permit are not based on the potential for toxicity but are based on the 1981 waste load allocation for maintaining Dissolved Oxygen criteria. See Fact Sheet at 13-14 (explaining that May and June-October limits are required to comply with waste load allocation; and considering, but rejecting as unnecessary, winter toxicity-based limits). Difficulty in maintaining compliance is not an adequate basis for modifying a water quality based effluent limit. Many municipal wastewater treatment facilities in New England are able to consistently nitrify year round.

The maximum daily effluent limit was in the 1985 permit for this facility and was maintained in the 2001 permit reissuance. Anti-backsliding rules prohibit reissuance of a

permit to contain effluent limitations which are less stringent than the comparable effluent limitations in the previous permit, except in limited circumstances not relevant here. *See* 40 C.F.R. § 122.44(l)(2).

**Comment #A10:** The City recently completed the combined manhole monitoring program and study required by paragraphs E.2, 3, and 4 of the permit. The study report is submitted with these comments as Attachment C. Therefore, these paragraphs should be removed from the permit.

The monitoring program and study, which included both dry and wet weather periods, identified a number of combination manholes where there was evidence of a transfer of sanitary wastewater and storm water. However, the study did not identify the causes of the transfers or the most effective measures for eliminating them. In some cases, manhole separation may be the appropriate remedy, but in other cases, the transfers may be caused by insufficient wet weather flow capacity or blockages. Therefore, manhole separation may not solve the problem in every case, and could, in fact, simply move the problem downstream. For this reason, the City requests that EPA modify Part 1.E. to require further study of those combination manholes identified in the recently completed monitoring program as experiencing transfers to determine the cause of the transfers and to develop a plan for eliminating the transfers. The City proposes to submit the plan for the study to EPA within three months of the effective date of the permit and to complete the study and submit a report to EPA within 12 months after EPA approves the plan.

**Response #A10:** The data submitted indicates that the monitoring requirements of E.2. - E.3. have been completed and most of the information required by E.4. has been provided. Accordingly, the requirements of Section E have been modified. Specifically, E.1 – E.3 have been eliminated from the permit and the requirement to remediate all combined manholes where there was evidence of transfer of sewage to storm drains or transfer of storm water to the sanitary sewer has been modified to include a longer schedule for remediation. The requirement to complete a log with specific information has been included with the section requiring monitoring in years three through five.

We recognize that complete separation may not be the appropriate action in all cases and the permit language does not require complete separation in all cases. Rather, the permit requires that combination manholes showing evidence of sewage/storm water transference be completely separated “or otherwise modified . . . to control the transfer of sewage and/or storm water.” However, where there are persistent structural problems and/or repeated blockages causing surcharging that is likely to recur, complete separation should be pursued. It is also important to note that the permit language continues to require that monitoring continue for all combined manholes that are not completely separated. The additional time for remediation should enable the City to complete the necessary study to determine the most appropriate method of remediation and to complete the remediation. All that said, EPA’s permit must ensure compliance with the Clean Water Act and protection of water quality standards, and cannot simply require that a study be completed without any requirement to remediate what may be long term illegal discharges.

**Comment #A11:** The City estimates that it has 220 combination manholes, not 250 as stated in the draft fact sheet.

**Response #A11:** The new estimate of the number of combined manholes in the City's sewer system is noted for the record.

**Comments were also received from Kopelman and Paige, on behalf of the Town of Lunenburg, in a letter dated September 21, 2009, and from the Town of Westminster, in a letter dated September 18, 2009. The draft permit imposed certain requirements on these towns as co-permittees.**

**Response # B0 (Co-permittee requirements).** After the close of the comment period on the draft permit, the Environmental Appeals Board issued a decision in *In re Upper Blackstone Water Pollution Abatement District*, NPDES Appeal Nos. 08-11, 08-12, 08-13, 08-14, 08-15, 08-16, 08-17, 08-18, 09-06 (EAB May 28, 2010), 14 E.A.D. \_\_\_. In that decision, the Board remanded the co-permittee requirements of that permit to EPA for further articulation of the statutory, regulatory, and factual bases for expanding the scope of NPDES authority beyond the treatment plant owner and operator to separately owned and operated collection systems. EPA is currently developing an appropriate response to the questions posed by the Board on remand.

As explained in the Fact Sheet and in responses to comments submitted by the City of Fitchburg, the permit provisions applicable to the Fitchburg East Wastewater Treatment Facility itself are necessary to address ongoing water quality problems in the Nashua River system and are independent of the co-permittee provisions. Moreover, the prior permit expired almost five years ago, and issuance of this final permit is long overdue. In EPA's judgment, the need for expeditious implementation of the permit provisions applicable to the Fitchburg East Wastewater Treatment Facility counsels against further delay in the issuance of the final permit. Consequently, EPA has elected to issue the final permit to the City of Fitchburg as sole permittee, and to defer further action regarding specific co-permittee requirements applicable to the Towns of Lunenburg and Westminster while EPA conducts a legal, policy and factual assessment of the co-permittee issue. As was the case under both the prior and draft permit, the City of Fitchburg remains responsible for preventing unauthorized discharges from its system, and must ensure that excess inflow and infiltration (regardless of origin) do not cause violations of effluent limitations or other permit requirements. (If the City of Fitchburg finds it appropriate to request that Westminster and/or Lunenburg make certain improvements to their collection systems in order to facilitate Fitchburg's compliance with permit requirements, the City may refer its concerns directly to those towns, pursuant to intermunicipal agreements or other means outside of the NPDES permit itself.)

For these reasons, the final permit does not include references to co-permittees in (i) the Title Page, (ii) paragraph I.B, (iii) paragraph I.C.3, or (iv) paragraph I.C.5. Consequently, it is not necessary to respond at this time to individual comments

submitted by the Towns of Lunenburg and Westminster with respect to provisions that are not included in the final permit. If EPA later determines that it is appropriate to include co-permittee requirements, EPA will take further action at that time according to the procedures of 40 C.F.R. part 124.

**The following specific comments were received from Kopelman and Paige, on behalf of the Town of Lunenburg, in a letter dated September 21, 2009:**

**Comment #B1:** Attachment A of Part I.B. is specific to Fitchburg's CSO outfalls only and is not specific to Lunenburg. This reference should be deleted from this section.

**Response #B1:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #B2:** The Town of Lunenburg's sewer system is primarily only 8-15 years old therefore, the system is considered "tight" and not a significant source of I/I. As such, the Town has not and is not currently working on I/I investigation and removal. If this requirement stays in place for the final permit, the Town will need to give attention to this issue on an annual basis in order to report status and progress. This requirement, specifically, the frequency of the reporting, is challenged based on the relative new age of the existing sewer system. The Town has not performed any I/I investigations to date, so it is not currently possible to determine the amount of I/I within the Town's existing sewer system. Accordingly, the Town requests that the reporting requirement be changed to every other year which will allow time for initial I/I investigation tasks to be completed.

**Response #B2:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #B3:** The requirement for an alternate power source appears to be in the wrong location in the permit. It references the permittee, not co-permittee and also references "...its treatment works...". The Town of Lunenburg does not currently own and operate municipal "treatment works", so this cannot be applicable to the Town. This should be clarified and corrected in the final permit.

**Response #B3:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #B4:** The Fact Sheet notes that there "may be some" attenuation of phosphorus discharged from the treatment plants and that the permit limit determination did not "factor in other nonpoint sources of phosphorus". Since attenuation was not included and other nonpoint sources were not included in the analysis, the results are an inaccurate representation on the part of DEP/EPA. It does not make sense to disregard these factors when determining such a limit.

On Cape Cod and for the SE Mass coastal communities, SMAST is performing modeling of 89 embayments to determine the nitrogen limits for each embayment so that each community can plan to deal with the point and nonpoint sources of nitrogen loading. Attenuation and nonpoint sources are included in these models and analyses. Why are

they not included in this analysis? It seems that this could be accomplished and it is inappropriate not to do so for this limit.

**Response #B4:** See Response #A7 (regarding attenuation and nonpoint source loads) above and Response #B5 (regarding establishing water quality based effluent limits in the absence of a final water quality model or TMDL) below.

**Comment #B5:** The Fact Sheet notes that preliminary water quality modeling of the Nashua and North Nashua Rivers has been completed and the results indicate that the proposed seasonal limit of 0.2 mg/l is appropriate. If final water quality modeling is pending, it is appropriate to wait for the results of such prior to issuing a draft and final NPDES permit.

**Response #B5:** In the absence of a TMDL, EPA is required to use available information to establish water quality limits when issuing NPDES permits for discharges to impaired waters. *See* 40 C.F.R. § 122.44(d). There is no indication that a final water quality model will be completed anytime soon given EPA's understanding of the schedule and progress for that effort at MassDEP, and the complexities of modeling nutrients in a complex riverine environment. Reissuance of this permit is long overdue and severe impairments from nutrients and bacteria need to be addressed.

**The following specific comments were received from the Town of Westminster in a letter dated September 18, 2009:**

**Comment #C1:** It is our understanding that even though the Town of Westminster is now being considered as a co-permittee, the only sections of this draft permit that apply to the Town are Part I.B., and Part I.C. We understand that the Town is not directly responsible for any other parts of the proposed permit or any of the costs and/or fines that may be associated with the permit. We understand that the specifics of our financial obligation for discharging wastewater to the City of Fitchburg shall be as agreed to between the Town of Westminster and the City of Fitchburg through our Intermunicipal Agreement.

**Response #C1:** See Response #B0 (regarding co-permittee provisions), above. The Town of Westminster is not directly responsible for any portion of the Final Permit.

Any financial arrangements between the Town of Westminster and the City of Fitchburg (e.g., cost-shifting) are beyond the scope of EPA's NPDES permit. Similarly, regarding the comment's statement that "the specifics of [Westminster's] financial obligation for discharging wastewater to the City of Fitchburg shall be as agreed to between the Town of Westminster and the City of Fitchburg through our Intermunicipal Agreement," the financial arrangements between the Town of Westminster and the City of Fitchburg are beyond the scope of EPA's NPDES permit.

**Comment #C2:** The General Requirements contained in Section II.D.1.e. were not included with the draft permit. A copy should be made available for our review and comment. Accordingly, please forward this section of the permit to the Town.

**Response #C2:** The standard language contained in the General Requirements that are a part of all municipal permits was posted on our web site along with the draft permit and the Fact Sheet when the draft permit was public noticed. The Public Notice contained a reference to the web site where all of the permit documents are posted. *See* Public Notice, at 2; Joint Extension of Public Notice, at 2; [http://www.epa.gov/ne/npdes/epa\\_attach.html](http://www.epa.gov/ne/npdes/epa_attach.html) (EPA Permit Forms & Attachments); <http://www.epa.gov/region1/npdes/permits/generic/PartIIfinal2007.pdf> (Part II standard conditions).

**Comment #C3:** Attachment A of Part I.B. is specific to Fitchburg's CSO outfalls only and is not specific to Westminster. This reference should be deleted from this section.

**Response #C3:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #C4:** Are the permittee and co-permittees to submit one joint I/I control plan, or are separate plans to be submitted for the permittee and co-permittees? It is our understanding that they will be separate.

**Response #C4:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #C5:** In the Fact Sheet, the statement "Many of these sewers are very old, and as a result there is significant infiltration and inflow (I/I) into the separate systems" is not necessarily accurate for the Town's existing wastewater collection system. The Westminster collection system, constructed in the 1980s, 1990s and 2000s, is relatively "young" for a collection system.

Westminster's collection system is also small in comparison to the City of Fitchburg's collection system. We acknowledge that the identification and removal of I/I is important in many ways. As such, the Town of Westminster has been working on I/I investigation and minimization for several years and continues such efforts at this time. However, annual reports may not be appropriate for the scale of our system and potential problems. We suggest an initial plan be submitted with follow-up every two years.

**Response #C5:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #C6:** The requirement for an alternate power source appears to be in the wrong location in the permit. It references the permittee, not co-permittee and also references "...its treatment works...". The Town of Westminster does not currently own and operate municipal "treatment works", so this cannot be applicable to the Town. This should be clarified and corrected in the final permit.

**Response #C6:** See Response #B0 (regarding co-permittee provisions), above.

**Comment #C7:** Similar to the Leominster draft permit, it is noted that there “may be some” attenuation of phosphorus discharged from the treatment plants and that the permit limit determination did not “factor in other nonpoint sources of phosphorus”. Why was attenuation not included and why were other nonpoint sources not included in the analysis? This may result in an inaccurate representation and “conservatism” of the total phosphorus effluent limit.

**Response #C7:** See response #A7 (regarding attenuation and nonpoint source loads) above.

**Comment #C8:** The Fact Sheet notes that preliminary water quality modeling of the Nashua and North Nashua Rivers has been completed and the results indicate that the proposed seasonal limit of 0.2 mg/l is appropriate. When will the final water quality modeling be complete? It seems appropriate to wait for the results of final water quality modeling prior to issuing a final NPDES permit.

**Response #C8:** See Response #B5 above.

**The following comments were received from the Nashua River Watershed Association in a letter dated September 17, 2009:**

**Comment #D1:** NRWA supports the total phosphorus limit of 0.2 mg/l for the plant at this time. Control of phosphorus discharges to the North Nashua River is essential to limit plant growth and the continued eutrophication in this impaired segment of the river, and in reaches of the river downstream of the plant. We have also advocated for the 0.2 mg/l TP limit for NPDES discharges at all other plants downstream of Fitchburg East (e.g., Leominster and Clinton).

**Response #D1:** EPA agrees that control of phosphorus discharges to the North Nashua River is essential to limit plant growth and the continued eutrophication in both the plant’s receiving segment and downstream segments. The comment is noted for the record.

**Comment #D2:** Infiltration and Inflow is one of the largest problems facing the plant, as excess water entering the system leads to increases in plant bypasses, CSOs, and mixing of storm and sewer discharges at combined manholes. NRWA supports the identification and elimination of the I/I problem, though we realize the schedule in the permit is a challenging one for the City to meet. In addition to I/I identification and elimination, the NRWA would like to see this permit promote the efforts of a Green Infrastructure approach throughout the City to reduce the volume of storm water entering the system and also improve water quality. New and redevelopment within the City may incorporate this approach to include the installation of permeable pavement, and the removal of impervious surfaces, the use of vegetated swales and tree boxes, and by promoting alternative parking and street designs.



**Response #D2:** The comment is noted for the record. Green Infrastructure is something the Agency actively promotes and encourages. Specific requirements are more appropriate for storm water permits, CSO remediation plans, or other nonpoint source management approaches, rather than the NPDES permit for point source discharges.

**1. Phosphorus concentration at point of discharge**

$$\text{Dilution} = 1.6$$

$$\text{Receiving water concentration} = \text{Effluent limit} / \text{Dilution}$$

$$= (0.2 \text{ mg/l}) / 1.6 = 0.125 \text{ mg/l}$$

**2. Phosphorus concentration at North Branch/South Branch confluence at seasonally adjusted design flow**  
**Using background concentration = 0.013 mg/l and attenuation rates of 5% and 10%**

To calculate seasonally adjusted design flow (X):

$$\frac{\text{Current 7Q10 flow}}{\text{Current ann avg flow}} = \frac{X}{\text{Permitted annual average design flow}}$$

POTW	Permitted design flow (MGD)	Current 7Q10 flow (MGD)	Current ann avg flow	X = adjusted flow
Fitchburg East	12.4	5.4	9.03	7.4
Leominster	9.3	3.7	5.81	5.9
MWRA Clinton	3	2.0	3.17*	2.0
Total		11.1		15.3

$$\text{Non-POTW flow} = 18.5 \text{ cfs} = 12.0 \text{ MGD}$$

\*Clinton is currently above design flow, so no adjustment applied

Mass balance equations:

$$(\text{Background concentration} * \text{non-POTW flow}) + (\text{Effluent limit} * \text{POTW flow} * (1 - \text{attenuation rate})) = (\text{Receiving water target concentration}) * (\text{Non-POTW flow} + \text{POTW flow})$$

Solving for the required effluent limit to meet a receiving water target concentration of 0.1 mg/l:

$$\text{Effluent limit} = \frac{(\text{Receiving water target concentration}) * (\text{Non-POTW flow} + \text{POTW flow}) - (\text{Background concentration} * \text{non-POTW flow})}{(\text{POTW flow} * (1 - \text{attenuation rate}))}$$

$$\text{Attenuation} = 5\% \quad \left( \frac{0.1 * (12.0 + 15.3) - (12.0 * 0.013)}{(15.3 * 0.95)} \right) = 0.18$$

$$\text{Attenuation} = 10\% \quad \left( \frac{0.1 * (12.0 + 15.3) - (12.0 * 0.013)}{(15.3 * 0.90)} \right) = 0.19$$